Appendix D -Snags and Coarse Woody Debris Management

SNAG AND COARSE WOOD DEBRIS MANAGEMENT APPENDIX

Management Direction/ Assessment Recommendations on Snags for Density Management Projects:

A management assessment should be prepared for each LSR before habitat manipulation activities are planned and implemented (USDA;USDI 1994). The LSR Assessment (USDA; USDI 1998) contains the following guidance on managing for snags in DM projects:

Density Management - Stand Selection Criteria

. . . Prescriptions to recruit snags in the future suitable for nesting and roosting may include a preparatory density management entry to maintain or increase either individual or stand growth rates followed by an entry to recruit snags. The second entry would usually occur when the number of trees greater than 16 to 20 inches would allow for recruiting snags without adversely affecting the stand trajectory toward late-seral/old-growth conditions.

Density Management - Desired Future Conditions

. . . Stands would be managed to have at least 5 snags per acre greater than 20 inches in diameter and 16 feet tall on north facing slopes and at least 3 snags per acre greater than 20 inches in diameter and 16 feet tall on south facing slopes. To meet this desired future condition, at least 3 snags per acre on north facing slopes and 1 snag per acre on south facing slopes will be retained on completion of any density management treatment.

South Fork Coos Watershed Analysis

The South Fork Coos Watershed Analysis (USDI 2001) contained the following information:

Table Snag-1 lists the snag nesting habitat minimum requirements (Brown 1985 and Marcot 1991) for the species of primary excavator birds found in the South Fork Coos Watershed:

Table Snag-1: Snag Requirements for Nesting and Roosting for the Primary Excavators Found in the South Fork Coos River Watershed

Bird Species	Minimun Snag DBH (with bark) usable by the species	Snag Decay Class usable by the bird species for nesting habitat	
		Hard Snags (decay classes 2-3)	Soft Snags (decay classes 4-5)
Downy woodpecker	11+	X	X
Red-breasted sapsucker	15+	X	
Hairy woodpecker	15+	X	
Northern flicker	17+	X	X
Red-breasted nutchatch	17+	X	
Pileated woodpecker	25+	X	

Table Snag-2: The Number of Snags Needed to Support 100%, Population Levels of Primary Excavators in a Forested Habitat in the South Fork Coos Watershed (from the Marcot 1991).

	Snag outside bark DBH class (inches)	Number of Snags/ 100 acres by decay class		Total snags/ 100 acres	Total snags/ 1 acre
		Hard snags (decay classes 2-3)	Soft snags (decay classes 4-5)		
Number of snags needed to support a 100% population	11+	8	8	16	0.16
	15+	237	0	237	2.37
	17+	100	24	124	1.24
	25+	6	0	6	0.06
	Totals:	**351**	**32**	**383**	**3.83**

The data in Table Snag-2 are from the Marcot model (1991) and show the number of snags by size and decay class to meet the 100% cavity nesting habitat needs for the primary excavator species in the South Fork Coos Watershed. As shown in the preceding two tables, the primary excavator birds have minimum snag diameter and state of decay requirements that must be met in addition to numbers of snags on the landscape. For example, retaining snags in decay class 4 or 5 will not provide the nesting habitat required by most of the species. In addition, a snag's decay class is not a static condition. As shown in Tables Snag-3, and Snag-4, leaving hard snags without making provisions for additional snag recruitment, will not necessarily provide snag habitat over the long term. This is because the hard snags smaller than 18.8-inches dbh will transition to soft snags within 30 years. This indicates that a second entry would be needed for snag creation, and that snags in the larger diameter classes will provide habitat for a longer period of time.

Table Snag-3: Estimated Age When Douglas-fir Snags Reach a Deterioration State (Adapted from Brown 1985 pg. 136, which in turn was adapted from Cline et al. 1980.)

snag size	decay class1	decay class2	decay class 3	decay class 4	decay class 5
3.6-7.2 inch dbh	0-4	5-8	9-16	17	fallen
7.6-18.8 inch dbh	0-5	6-13	14-29	30-60	>60
>18.8 inch dbh	0-6	7-18	19-50	51-125	>125

Table Snag-4: Stand Age When the Average New Mortality Meets or Exceeds the Minimum Snag Diameter Used by a Range of Primary Excavator Species

Snag dbh	SI 115, 291 trees/ ac at age 32			SI 127, 259 trees/ac at age 31		
	unthinned stand	Stand thinned to 120 trees/ ac at age 40-yrs	Stand thinned to 60 trees/ ac at age 40-yrs	unthinned stand	Stand thinned to 120 trees/ ac at age 40-yrs	Stand thinned to 60 trees/ ac at age 40-yrs
11-inches +	60-yr old	50-yr old	50-yr old	40-yr old	40-yr old	40-yr old
15-inches +	100-yr old	60-yr old	50-yr old	70-yr old	50-yr old	50-yr old
17-inches +	120-yr old	70-yr old	50-yr old	80-yr old	50-yr old	50-yr old
25-inches +	>200-yr old	>200-yr old	not determined	200-yr old	170-yr old	90-yr old

Table Snag-4 shows the stand age, for two example stands, when the average new mortality meets or exceeds the

minimum snag diameter used by a range of primary excavator species for a range of sites and management conditions. This suggests for similar stands that 50-year old and younger second growth stands will not reliably provide hard snags except on the better sites and in thinned stands. The dbh for hard snags in these young stands will be 11 inches or less and thus will only provide suitable nesting habitat for the smaller excavator species.

For more detailed information consult the snag chapter in Brown (1985) for a general discussion snag habitat, Huff and Raley (1991) on optimizing snag habitat, Peet and Christensen (1987) on tree mortality/ snag recruitment, and Hutto (1995) on snag patches as landscape features.

The following is from the assessment of density management and attainment of ACS Objectives:
The stand age when the opportunity to use active management to recruit large wood is based on when the average stand diameter is equal or greater than the minimum diameter suitable for a particular type of snag or down wood habitat or riparian function. Optimal attainment of all riparian functions is most likely when trees selected to become down wood and snags are recruited from the middle third and lower third size classes represented in the stand. The alternative of killing the largest fastest growing trees in the stand will result in the following:

- delayed attainment of large green trees [Minimum standards for old-growth Douglas-fir on hemlock sites include ≥8 Douglas-fir/ ac. > 32-in. dbh or 200-yr old. (Old-growth Definition Task Group 1986)]
- will kill the trees with the deepest crowns, and thus retard attainment of stands with a deep canopy condition. Deep canopies are a standard used to define old-growth (Old-growth Definition Task Group 1986).
- constitutes a form "selection pressure" against the segment of the tree population that is genetically best adapted to the site (Smith 1962).
- *In summary*: Obtaining down wood or snags by killing or cutting conifer trees that rank among the largest third in the stand will allow more rapid attainment of large down wood and snags but will retard attainment of other LS/OG attributes. This may also be inconsistent with Riparian Reserve Standard and Guide WR-1 intentions of conserving genetic integrity of native species.

Lundquist and Mariani (1991) observed that cavity-nesting birds show a disproportional preference for large (>20-inch dbh) snags. Lundquist and Mariani concur with several authors cited in their paper that argue for snag management based on mean nest-tree diameters instead of minimum diameter guidelines. Based on their study, Lundquist and Mariani recommend managing for snags of at least at 30-inches. Lundquist and Mariani also observed cavity-nesting species had a strong preference for decay class II and III snags, and in western Washington, preferred Douglas-fir, hemlock and western hemlock snags to snags of other tree species.

The following recommendations are for Riparian Reserve stands that are less than 80-years old:

Snags: Several of the following snag management recommendations are drawn from the LSR Assessment (USDI; USDA 1998) as the intent is to provide consistency between the recommendations for the Riparian Reserve and the Late-Successional Reserve. The recommendations are:

- Manage stands to attain snag sizes, numbers, and decay classes that will support 100% of potential population levels of those primary excavator species using the watershed by stand age 100-years.
- Use stand growth models, or other techniques, to design density management treatments to put the stands on a trajectory to produce 17-inch dbh snags by age 60-years, and 20-inch dbh and larger snags by age 100-years.
- If it is necessary to kill trees to provide snag and down wood habitat, select trees to kill from among the smaller two-thirds of the trees in the stand. Killing trees from among the larger third of the trees in the stand will delay attainment of other late-successional attributes and would select against the trees that are best adapted to the site.
- The above table *(See Table Snag-2)* shows the minimum sized snags that the primary excavator species can use. The primary excavator species prefer to use larger snags when available (20-inch dbh minimum, at least 30-inch dbh average). Therefore, manage Riparian Reserve stands to provide 3.8 snags per acre greater than 20-inches dbh by age 100-years, where it is practical to do so without delaying attainment of other late-successional habitat attributes or preventing attainment of ACS objectives in the long term.
- On a site by site bases, ID teams may defer attaining snag levels supportive of 100% of potential population

levels if the ID team finds that attaining the snag recommendations would delay attainment of scarce late-successional habitat attributes, or would prevent the attainment of ACS objectives in the long term.
- ID teams may defer killing trees to attain target snag levels if post-treatment mortality following a density management treatment is predicted. However, at least 3 snags per acre on north facing slopes and 1 snag per acre on south facing slopes will be retained on completion of any density management treatment.

Recommendations for snags in alder conversions:
On sites where alder stands will be converted to a conifer or mixed stands:
- Retain all releaseable conifers.
- Retain existing conifer snags and conifer CWD.
- Retain myrtles, bigleaf maples, and other long lived hardwood trees to the extent it is compatible with establishing a conifer component on the site.
- Where large live myrtles and bigleaf maples are present on conversion units, ID teams may want to experiment with providing cavity habitat by pruning up to 3 large limbs/ acre. This would encourage formation of rotten limb stumps that can eventually provide cavity habitat for excavator species.

Tioga Creek DM Units:

The target for LSR density management units is to provide snag levels that can support 100% of potential populations of primary excavator species. Snag creation would target stands that can provide snag recruitment with conifer trees equal or greater to 16 inch dbh. In some stands where the diameter distribution may limit recruitment of well distributed snags, 15 inch diameter trees would also be selected for snag creation. The 15 - 16 inch dbh size was targeted as it constitutes 68 percent of the snag requirements for hard snags based on the Marcot (1991) model. Based on Table Snag-3, snags that are created from trees in this dbh class will enter decay class 4 in 30 to 60 years. These snags will provide habitat in the interim. Based on Table Snag-4, stands that are thinned to 60 trees per acre at age 40 (SI 127 - 259 tpa) will recruit new mortality of 25 inch plus dbh trees at stand age 90, (50 years after the thinning treatment), which would meet the LSRA, South Fork Coos WAU, and Lundquist and Mariani (1991) recommendations for snags greater than 20 inch dbh.

The following design criteria were utilized in calculating snag recruitment levels needed for each unit (Table CWD-2):
- All but one conifer dominated unit, where snags were inventoried as part of the stand exam, had at least 4 snags/ acre (decay classes 1 through 3 and all diameter classes counted)(Table Snag-5). This meets the LSRA recommendation of having at least 3 snags per acre on north facing slopes, and 1 snag per acre on south facing slopes (decay class and dbh size were not a factor). For the majority of the units however, the snags are in the smaller dbh size classes of 11 inches or less. The tree diameter distributions generally would not support snag and CWD recruitment in the units where no formal snag inventories were done. However, field observations showed suppression mortality resulting in more that 3 dead trees/ acre in these units.

- For most units, the opportunity to recruit 16 to 20 inch diameter snags would occur in combination with a second density management treatment 15 to 25 years from now. Current diameter distributions for most units limit options for recruiting large snags without adversely affecting the stand trajectory toward late-seral/ old-growth conditions.

- Snags would be created from leave trees that rank among the middle third dbh size class in the stand so as to not take from the dominant live trees. Snag creation would be postponed if trees in the middle third diameter size class are smaller than 15 inch dbh.

- There are some stands (13a, 14c) that have an average diameter of 15" or greater, but the main component is alder. Alder will not be retained for snag creation due to the quick decomposition of the wood.

Stand Exam Data for Number of Snags in Decay Class 1 - 3 **

Unit # *	1-11"/acre	11-19"/acre	>20"/acre
1			
2			
3a			
3b	62	0	0
4	98	0	0
5a	39	6	0
5b	4	0	0
5c			
6a			
6b			
6c			
6d			
8			
10			
11			
12a	5	0	0
12b	15	0	2
13a			
13b	0	0	0.2
14a			
14b	11	0	0.4
14c			
15a			
15b			
15d	28	7	0
15e			
15f			
15g			
15h			
16			
17	143	0	0
18	18	19	5
19	23	20	2
20	14	8	17
21	67	8	14
22b	87	0	0
22c	0	0	0.3
23			

24	0	7	6
25	75	0	0
26	56	0	2
27	0	0	0.5

* Units dropped 7, 9, 15c, 22a
** Snag data are from stand exams - no snag data was taken for columns that are blank

Table Snag-5. Stand exam data for existing snags.

Management Direction/ Assessment Recommendations on Coarse Woody Debris for Density Management Projects:

The Forest Plan ROD says a management assessment should be prepared for each LSR (or group of smaller LSRs) before habitat manipulation activities are planned and implemented. The LSR Assessment (USDI; USDA 1998) prepared in accordance to the Forest Plan contains the following guidance and recommendations on managing CWD in density management projects:

Desired Future Conditions

. . . Maintain and/ or restore key structural components (large trees, snags and down logs) to mimic the abundance, condition and distribution of these structures. . . (pg. 62)

Treatment Guidelines for NSO Home Ranges

. . . When considering treatments of these stands the IDT should maintain . . . CWD. (pg. 70)

Density Management-Commercial thinning

. . . Where necessary, active recruitment of snags/ CWD . . . can be done concurrently [with thinning]. *. . . Besides shaping the overstory, density management may also focus on creating gaps, setting the stage for understory regeneration, and recruiting snags and CWD.* (pg. 80)

Density Management in Riparian Reserves [that are also inside the LSR]

The guidelines shown in Table 22 are recommendations for the coarse wood levels that should exist at stand age 80 [for LSR stands that are also inside the Riparian Reserve].

Table 22. Recommended Range for Retention Levels of CWD (cu.ft./ac.)

Province	*Within the First Site Potential Tree Height from Any Perennial Stream*	*Within the Second Site Potential Tree Height from Any Perennial or First Site Potential of Any Intermittent Stream*
Coast Range	*3,600 - 9,400* [1]	*1,600 - 2,300* [2]

[1] *Ursitti, 1990. Includes all wood 4 inches and 1 meter in length and longer*
[2] *Spies, 1988/1991*

Prior to management activities, coarse wood surveys should be conducted in order to determine current wood levels. It is expected that in some stands, current levels will not meet the above guidance. Where this is the case, addition of wood during the proposed management activity may be necessary. It may not be possible, nor preferable, to meet the full guidance at the time of entry but rather to calculate the needs for the future stand [and prepare a strategy how the desired levels of CWD will be attained.] (pg. 90-91)

REO Review Exemption Criteria (attached to the LSR Assessment)

. . . Treatments need to take advantage of opportunities to improve habitat conditions beyond "natural conditions." For example, exceeding "natural levels" of CWD within a 35-year-old stand can substantially improve the utility of theses stands for late-successional forest-related species. Treatments must take advantage of opportunities to optimize habitat for late-successional forest-related species in the short term. . . .

. . . Within the limits dictated by acceptable fire risk, CWD objectives should be based on research that shows optimum levels of habitat for late successional forest related-species. And not be based simply on measurements within "natural stands." For example, recent research by Casey and Johnson in young stands on the westside indicates owl prey base increases as CWD (over 4") within Douglas-fir forests increases, up to 8- to 10-percent groundcover south of the town of Drain, Oregon . . .

The South Fork Coos Watershed Analysis (USDI 1999) contains the following recommendations for CWD

management and retention inside the Riparian Reserves:

Riparian Reserves inside the LSR:

- *Follow LSR Assessment recommendations.*
- *Integrate treatments inside and outside the Riparian Reserves so they fit the larger landscape.*

Down Wood: Manage stands so that when the stands are 80-years old, they will have the potential to attain the following levels of down wood. These recommendations for down wood attainment are based on Spies and Franklin (1991), Spies et al. (1988), and Ursitti (1990):

- *First site potential tree height – 3,600 - 9,400 cubic feet/ acre (includes all wood 4-inches in diameter and 1-meter long and larger).*
- *Second site potential tree height– 1,600 - 2,300 cubic feet/ acre (includes all wood greater than 4-inches on the large end).*
- *At least 255 cubic feet of decay class I or II[1]. Where possible and consistent with obtaining other late-successional stand characteristics, obtain decay class I and II amounts comparable with the upper end of the range observed in old-growth (385 cubic feet/ acre). These higher levels would enhance habitats for large woody debris associated species and would compensate for those areas where large woody debris amounts are near or below the natural variability.*

Meeting these levels of down wood may be unobtainable or in some cases undesirable in younger stands. However, density management treatment designs should put stands on a trajectory to attain these levels by stand age 80-years, or provide for supplementing down wood levels through future projects.

CWD Amounts Found in Natural Stands:

Table CWD-1: Down Woody Debris Volumes in Natural Young, Mature, and Old-Growth Douglas-fir Forests in Oregon and Washington from Spies; Franklin (1991)

	young stands: 40 to 80-years old	mature stands: 80 to 195-years old	old-growth stands: >195-years old
Decay class 2: average cubic meters/ hectare	2.0	8.3	16
Decay class 2: 95% confidence limits of the mean expressed in cubic meters/ hectare	0.9 to 4.5	3.9 to 17.8	9.6 to 26.9
Decay class 2: average cubic feet/ acre	28.6	118.7	228.8
Decay class 2: 95% confidence limits of the mean expressed in cubic feet/ acre	12.9 to 64.4	55.8 to 254.5	137.3 to 384.7
Log volume: average cubic meters/ hectare	223	124	266
Log volume: 95% confidence limits of the mean expressed in cubic meters/ hectare	163 to 305	93 to 165	219 to 324
Log volume: average cubic feet/ acre	3,188.9	1,773.2	3,803.8
Log volume: 95% confidence limits of the mean expressed in cubic feet/ acre	2,330.9 to 4,361.5	1,329.9 to 2,359.5	3,131.7 to 4,633.2

Notes: The volumes include all woody debris 4 inches in diameter and larger as measured on the large end.
Conversion factor: 1cubic meter/ hectare = 35.3 cubic feet /2.471 acres or 14.3 cubic feet / acre

[1] ROD/RMP CWD direction for the Matrix rule is retain at least 120 lineal feet of decay class I & II logs that are at least 16"X16'. A 16' long log, 14" small end & 16" large end, contains 19.7 cubic feet. If we obtain the minimum standard of 120 lineal feet of logs that are 16'X16" (7.5 16-ft logs/ acre), we will have 147.75 cubic feet/ acre. Spies & Franklin (1991) show the following levels of decay class II material 4" diameter & larger by age class: 13 to 64 cubic feet in 40 to 80-yr old stands; 56 to 255 cubic feet in 80 to 195-year old stands and 137 to 385 cubic feet in older stands.

Estimating Cubic Foot Volumes

The accepted method of estimating cubic foot volume of a tree is to sum the estimate volumes for each log in the tree. Attempts to derive a formula for estimating cubic foot volume of an entire tree have not been satisfactory. However as a rule-of-thumb, one half the dbh squared [$(dbh/2)^2$] gives a rough estimate of the cubic foot volume in a second growth Douglas-fir (Dilworth 1976 pg. 173) and may be useful for estimating cubic foot of CWD in the field.

The following table displays cubic foot volume to a 4-inch top for Douglas-fir trees and may be useful to estimate cubic foot volume recruitment based on cutting and leaving trees of certain diameter classes.

CWD-3: Tree Volume to a 4-Inch Top, excluding a 1.5-foot stump (from Hartman *et al.*, no date)

	Total tree height in feet							
DBH class	50	60	70	80	90	100	110	120
15	21.5	26.4	31.3	36.2	41.1	45.9	50.7	55.4
16	--	29.6	35.1	40.6	46.1	51.5	56.8	62.1
17	--	32.9	39.1	45.2	51.2	57.3	63.2	69.2
18	--	36.4	43.2	49.9	56.6	63.3	69.9	76.5
19	--	47.4	54.8	62.2	69.5	76.8	84.0	91.1
20	--	51.8	59.9	67.9	76.0	83.9	91.8	99.6

Light grey shaded blocks indicates cutting and leaving 4 trees/ ac of these sizes will produce at minimum 255 cubic feet of decay class I CWD that is greater than 4-inches in diameter. (255/4 = 63.75)
medium gray shaded blocks indicates cutting and leaving 3 trees/ ac of these sizes will produce at minimum 255 cubic feet of decay class I CWD that is greater than 4-inches in diameter. (255/3 = 85)

Forest Health Considerations

The following is the epidemiology of Douglas-fir beetle (*Dendroctonus pseudotsugae*, provided by Donald J. Goheen, Entomologist/Plant Pathologist with the USDA, USFS, Southwest Oregon Forest Insect and Disease Service Center:

- Under normal circumstances, Douglas-fir beetles do not infest and kill green healthy Douglas-firs. Rather, small endemic populations of these beetles survive in greatly weakened trees, especially trees in root disease centers.
- On occasion, Douglas-fir beetle populations may increase to epidemic proportions. Outbreaks are triggered by events that produce large numbers of weakened hosts all at one time. Fires may occasionally set off population increases, but major wind or snow events that cause many trees to topple or break much more commonly do so. Cutting trees and leaving the logs on site creates the same kind of condition as a blow-down event from the prospective of Douglas-fir beetles.
- Douglas-fir beetles will infest down Douglas-firs of 10 inch diameter or greater and will produce brood. Down trees occurring under a still-standing canopy provide optimal breeding habitat since beetles prefer and are most successful on down material that is shaded, cool, and moist.
- Douglas-fir beetles occurring in the vicinity will attack down Douglas-firs in the spring of the year after the trees come down (usually from April to June). They are able to detect stressed or downed trees over considerable distances. Douglas-fir beetles have a one-year life cycle, and the new brood will emerge from the down trees in the spring of the subsequent year. If there are enough of them, Douglas-fir beetles emerging from down logs can infest standing trees.
- Douglas-fir beetle infestation of green trees occurs when brood has emerged from a fairly substantial number of down trees. Based on past experience, the threshold appears to be at least 4 down Douglas-firs $\geq$ 10 inches diameter per acre. The more down host trees there are and the larger the size of the down trees, the greater the likelihood that emerging beetles will infest green trees and the larger the number of trees that will likely be

infested.

- Number of green Douglas-firs that are infested by beetles emerging from down trees is usually a function of the number of down trees that the beetles breed in. Generally, in the year that the beetles emerge from down Douglas-firs, one standing green tree is infested for every 3 down trees. The next year, one additional host is infested for every 4 to 5 Douglas-firs that were attacked in the first year, and in the third year, one additional green tree will be infested for every 25 that were infested the year previously. Outbreaks usually subside in the fourth year. During the entire course of an outbreak, 4 standing green trees can be expected to be infested for every 10 down infested Douglas-firs.
- Most commonly, beetle-caused mortality of standing Douglas-firs will be concentrated fairly near the downed trees initially attacked by the beetles. However, Douglas-fir beetles are strong fliers, and in a certain percentage of cases (10 to 20 percent), they infest trees one to 5 miles away from where they emerge.
- During outbreaks when Douglas-fir beetles infest standing green trees, they often show a preference for the largest Douglas-firs in a stand and also often cause concentrated mortality, killing all of the trees in patches that vary in size from ¼ to 2 acres.

Based on this epidemiological information, the number of large trees (greater than 10-inch dbh) that can be safely killed in a single year to recruit snags, coarse wood and instream wood, and still maintain stand health, is 4 trees/ acre.

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Table6: Summary of Coarse Woody Debris and Snag Transects for Candidate Density Management Units in the Late-Successional Reserve Portion of the Tioga Subwatershed, with Proposed In Steam, Snag and Coarse Woody Debris Recruitment Levels

Notes: CWD ≥- inch diameter, and ≥8-feet long was measured in transects. Ursitti (1990) measured all CWD ≥4-inch diameter and >1-meter long. Spies and Franklin (1991) measured all CWD ≥4-inches in diameter. Ages in the table are age at breast height (4.5 ft. above the ground). Pretreatment dbh are from the stand exams. The target diameter for in stream wood, snags, and CWD may be adjusted upward at the time the project is implemented, to reflect the growth after the stand exams were completed.

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2				
Sec. 13, T.26S.,R10 W. OI: 243573 / Unit 1 (no hdwd CWD)	8 - 15	0	0	1,056	1,056													No treatment to obtain terrestrial CWD & snags - residual dbh would be too small to contribute the required sizes.	10 in/ 77 ft	0	0	0
	16+	0	0	1,879	1,879								0.0	0.0					--			
	all ≥ 8	0	0	2,935	2,935	26	below	below	below	within	exceed	below			exceed	below	below		--			
Sec. 13, T.26S.,R10 W. OI: 243573 / Unit 2 (no hdwd CWD)	8 - 15	0	0	1,056	1,056													No treatment to obtain terrestrial CWD & snags- residual dbh would be too small to contribute the required sizes.	10 in/ 77 ft	0	0	0
	16+	0	0	1,879	1,879								0.0	0.0					--			
	all ≥ 8	0	0	2,935	2,935	26	below	below	below	within	exceed	below			exceed	below	below		--			
Sec. 17, T.26S.,R.9 W. OI: 240062 / Unit 3a (no hdwd CWD)	8 - 15	0	0	1,364	1,364													No treatment to obtain terrestrial CWD & snags- residual dbh would be too small to contribute the required sizes.	11 in/ 74 ft	12 trees = 0.39 t/ac largest tree ≤14 in dbh /100 ft of stream	0	0.39 tree/ac
	16+	0	0	1,060	1,060								0.0	0.0					--			
	all ≥ 8	0	0	2,424	2,424	27	below	below	below	within	exceeds	below			exceed	below	below		--			
Sec. 17, T.26S.,R.9 W. Shotgun OI: 240070 / unit: 3B (no hdwd CWD)	8 - 15	0	0	563	563													CWD recruitment not needed	14 in/ 81 ft	0	3 snag/ ac 16-18 in dbh	0
	16+	0	3,836	3,847	7,683								7.0	684.2				Creating 2.5 snags/ ac would provide100% habitat levels for excavators using 11"+ & 15"+ snags.	0 snags			
	all ≥ 8	0	3,836	4,410	8,246	57	exceed	exceed	exceed	exceed	exceed	exceed			exceed	within	exceed		0 snags			

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2				
Sec. 17, T.26S.,R.9W. unit 4 (myrtle understory unit)	8 - 15	--	--	--	--													No treatment - meets CWM levels based on field observations snag recruitment options limited. Creating 1 snag/ ac would provide 40% habitat levels for excavators using 11"+ & 15"+ snags	11 in/ 82 ft 0 snags 0 snags	0	1snag/ ac 15 to 18 in.	0
	16+	--	--	--	--								--	--								
	all ≥ 8	--	--	--	--	38	--	--	--	--	--	--			--	--	--					
Sec. 18, T.26S.,R9W. Hatcher OI: 240089 / unit: 5A (no hdwd CWD)	8 - 15	0	13	1,500	1,513													Treat stand to provide future DC2 CWD: Obtain 255+ cu ft of DC 1&2 by recruiting 1 tree/ acfor CWD. Recruit 1 snag/ ac. to insure larger snags present for excavators needing 15"+ & 17"+ snags	13 in/ 95 ft 6 snags 0 snags	18 trees = 0.09 t/ac 16 to 18 in dbh or largest trees <18 in dbh /100 ft of stream	1snag/ ac 16 to 18 in.	1 trees/ ac 16 to 18 in dbh
	16+	54	156	3,389	3,599								0.7	54.7								
	all ≥ 8	54	169	4,889	5,112	41	exceed	within	within	exceed	exceed	exceed			exceed	within	below					
Sec. 24, T.26S.,R10W. Hatcher OI: 240382 / unit:5B (no hdwd CWD)	8 - 15	0	0	1,064	1,064													Recruiting 1 tree/ ac will put DC 1+2 levels in range of DC 2 observed in old-growth (Spies; Franklin 1991) recruiting 2 snags/ ac would provide habitat at 60% level for excavators using 15"+ & 17"+ snags	13 in/ 91 ft 0 snags 0 snags	0	2 snags/ ac 16 to 19 in dbh	1 tree/ ac 16 to 19 in dbh
	16+	68	45	3,389	3,502								1.3	100.6								
	all ≥ 8	68	45	4,453	4,566	33	within	below	below	exceed	exceed	within			exceed	within	below					
Sec. 19, T.26S.,R9W. Hatcher OI: 240086 / unit: 5C (no hdwd CWD)	8 - 15	0	0	767	767													Recruiting 1 tree/ ac will put DC 1+2 levels in range of DC 2 observed in young stands (Spies; Franklin 1991) Recruiting 2 snags/ ac would provide habitat at 60% level for excavators using 15"+ & 17"+ snags	10 in/ 71 ft -- --	0	2 snags/ ac 16 to 18 in dbh	1 tree/ ac 16 to 18 in dbh
	16+	0	0	2,841	2,841								0	0								
	all ≥ 8	0	0	3,608	3,608	23	below	below	below	within	exceed	within			exceed	within	below					

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location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2					
Sec. 23, T26S.,R10W. Hog-Water OI: 240362 unit: 6A (no hdwd CWD)	8 - 15	0	0	1,606	1,606													110 ac thin; 4 ac alder conversion Diameter distribution limits options for snag and CWD recruitment. Amounts of DC 1+2 CWD within range of DC 2 for old-growth (Spies; Franklin 1991). Need for instream wood. CWD recruitment would insure presence of mid-size pieces of down wood. Recruit 1 snag/ ac to provide 40% habitat potential for excavators using 11"+ & 15"+ snags.	see note ****	27 trees = 0.24 trees/ ac conifer draws- largest tree <16 in dbh/ 100 ft of stream alder draws- select the largest alder that can reach the creek in each 100 ft reach.	1 snag/ ac 15 to 16 in dbh	1 tree/ ac 15 to 16 in dbh
	16+	123	21	2,866	3,010								1.2	97.7					--			
	all ≥ 8	123	21	4,472	4,616	33	below	below	below	exceed	exceed	within			above	within	below		--			
Sec. 23, T26S.,R10W. Hog-Water unit: 6B	8 - 15	--	--	--	0													units 6A & 6C, in the same area as this unit, have abundant DC 3, 4, & 5 and some DC 1&2. Recruiting 1 tree/ ac for CWD will add at least 29 cu ft of DC 1. This level is in range of DC 2 observed in young stands (Spies; Franklin 1991) recruiting 2 snags/ ac would provide habitat at60% level for excavators using 15"+ & 17"+ snags	10 in/ 63 ft	12 trees = 0.33 trees/ac 16 to 17 in dbh or largest trees <17 in dbh /100 ft of stream	2 snag/ ac 16 to 17 in dbh	1 trees/ ac 16 to 17 in dbh
	16+	--	--	--	0								--	--					--			
	all ≥ 8	0	0	0	0	30	--	--	--	--	--	--			--	--	--		--			

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2					
Sec. 23, T26S.,R10W. Hog-Water OI: 240382 unit: 6C (no hdwd CWD)	8 - 15	0	0	2,154	2,154													No treatment to obtain terrestrial CWD & snags- residual dbh would be too small to contribute the required sizes.	8 in/ 56 ft	6 trees = 0.27 trees/ ac largest tree ≤14 inch dbh/ 100 ft of stream	0	0.27 trees/ac
	16+	0	78	2,227	2,305								10.7	410.5					--			
	all ≥ 8	0	78	4,381	4,459	26	exceeds	within	below	exceeds	exceeds	within			above	within	below		--			
Sec. 24, T.26S.,R10 W. Hog-Water OI: 240377 / unit:6D (no hdwd CWD)	8 - 15	0	0	1,057	1,057													No treatment to obtain terrestrial CWD & snags- residual dbh would be too small to contribute the required sizes.	10 in/ 66 ft	0	0	0
	16+	0	0	4,425	4,425								0	0					--			
	all ≥ 8	0	0	5,482	5,482	20	below	below	below	exceed	exceed	exceed			exceed	within	below		--			
Sec. 21, T.26S.,R9W. Shotgun OI: 240106 / unit: 8 (no hdwd CWD)	8 - 15	0	0	219	219													No treatment to obtain terrestrial CWD & snags- residual dbh would be too small to contribute the required sizes.	11 in/ 79 ft	30 trees = 0.30 t/ ac largest tree ≤13 inch dbh/ 100 ft of stream	0	0.30 tree/ac
	16+	0	20	1,568	1,588								0	0					--			
	all ≥ 8	0	20	1,787	1,807	29	within	below	below	below	within	below			within	below	below		--			
Sec.25 , T.26S.,R10 W. Middle Tioga OI: 243129 / unit: 10 (hdwd CDW = 0.5 tons/ac - 50 cubic ft)	8 - 15	0	0	491	491													99 ac unit. Alder conversion on 19 ac.	13 in/ 87 ft	33 trees = 0.42 t/ac	0	0.42 tree/ac
	16+	43	23	1,912	1,978								0.6	34.2				No treatment to obtain terrestrial CWD & snags - residual dbh would be too small to contribute the required sizes.	--	largest tree ≤15 inch dbh/ 100 ft of stream		
	all ≥ 8	43	23	2,403	2,469	36	below	below	below	within	exceed	below			exceed	below	below		--			
Sec. 35, T.26S.,R10 W. Middle Tioga OI: 240413 / unit: 11 (no hdwd CWD)	8 - 15	0	0	1,212	1,212													alder conversion areas in unit	8 in/ 73 ft	18 trees = 1.14 t/ac largest tree ≤13 inch dbh/ 100 ft of stream	0	1.14 tree/ac
	16+	0	47	1,329	1,376								0	0				No treatment to obtain terrestrial CWD & snags - residual dbh would be too small to contribute the required sizes.	--			
	all ≥ 8	0	47	2,541	2,588	30	within	below	below	within	exceed	below			exceed	below	below		--			

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2				
Sec.35 , T.26S.,R10 W. Middle Tioga OI: 240494 / unit:12A (no hdwd CWD)	8 - 15	0	15	749	764													possible alder conversion areas in unit	10 in/ 69 ft	9 trees = 0.42 t/ac	0	0.42 tree/ac
	16+	0	0	2,159	2,159								0	0				No treatment to obtain terrestrial CWD & snags - residual dbh would be too small to contribute the required sizes.	0 snags	largest tree <13 inch dbh/ 100 ft of stream		
	all ≥ 8	0	15	2,908	2,923	24	within	below	below	within	exceed	below			exceed	below	below		0 snags			
Sec. 35, T.26S.,R10 W. Middle Tioga OI: 240502 / unit: 12B (no hdwd CWD)	8 - 15	0	0	384	384													recruit 1or 2 tree/ ac for CWD to obtain DC1+ 2 amounts within the range of DC2 observed in young stands (Spies; Franklin 1991) creating 1 snag/ ac would result in ≥60% of habitat for excavators using 15"+ and 17"+ snags	15 in/ 90 ft	12 trees = 2.4 t/ac 18 to 23 in dbh or largest trees ≤23 in dbh /100 ft of stream	1 snags/ ac 18 to 23 in dbh	2.4 trees/ ac 18 to 23 in dbh
	16+	0	0	1,587	1,587								0	0					0			
	all ≥ 8	0	0	1,971	1,971	58	below	below	below	below	within	below			within	below	below		2 snags			
Sec.35 , T.26S.,R10 W. OI: 140498 unit 13A	8 - 15	--	--	--	--													alder conversion most of unit is close to road. Insufficient conifer stocking to support CWD and snag recruitment treatment	15 in/ 52 ft	0	0	0 conifer CWD. Leave 2 alder logs/ ac at least 10? in large end by 16 ft long. determine diameter after cruise is done
	16+	--	--	--	--								--	--					--			
	all ≥ 8	--	--	--	--	33	--	--	--	--	--	--			--	--	--		--			

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2				
Sec.35 , T.2S6.,R10 W. Middle Tioga OI: 240499 / unit: 13B (mixed stand - hdwd CDW = 0.4 tons/ac - 43 cubic ft)	8 - 15	0	0	230	230													alder conversion areas in unit Recruiting 1 tree/ac would result in DC 1+2 CWD amounts within the range for mature stands (Spies; franklin 1991). creating 2 snags/ ac would result in ≥60% of habitat for excavators using 15"+ and 17"+ snags UNIT IS A C LUMPY MIX DF-RA HOW DO WE ADMINISTER THE CWD & SNAG PART OF THE CONTRACT?	12 in/ 80 ft 0 snags 0.2 snags	36 trees = 0.63 t/ac 15 to 16 in dbh or largest trees <16 in dbh /100 ft of stream	2 snags/ ac 15 to 16 in dbh	1 tree/ ac 15 to 16 in dbh
	16+	0	22	564	586								0	0							
	all ≥ 8	0	22	794	816	35	within	below	below	below	below	below			below	below	below				
Sec.32 , T.26S.,R9W. Lower Tioga OI: 241278 / unit: 14A (no hdwd CWD)	8 - 15	0	0	940	940													2 trees/ ac recruited for CWD would provide DC1+2 levels within the range of DC 2 amounts typical for mature stands (Spies; Franklin 1991) Recruit 1 snag/ ac based on field observation	14 in/ 107 ft -- --	0	1 snag/ ac 17 to 23 in dbh	2 tree/ac 16 to 23 in dbh
	16+	0	0	1,268	1,268								0	0							
	all ≥ 8	0	0	2,208	2,208	61	below	below	below	below	within	below			within	below	below				
Sec. 31, T.26S.,R9W. OI: 240133 / unit: 14B W. of Coos R. Mainline (hdwd CDW = 0.9 tons/ac - 71 cubic ft)	8 - 15	0	0	1,064	1,064													No treatment to obtain terrestrial CWD & snags - residual dbh would be too small to contribute the required sizes.	13 in/ 82 ft 0 snags 0.4 snags	0	0	0
	16+	0	0	1,959	1,959								0	0							
	all ≥ 8	0	0	3,023	3,023	50	below	below	below	within	above	below			exceed	below	below				

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location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2				
Sec. 31, T.26S.,R9W. OI: 240133 / unit: 14C E. of Coos R. Mainline (no hdwd CWD)	8 - 15	0	0	117	117													alder conversion & release existing conifer	16 in/ 103	0	0	0 conifer CWD. Leave 2 alder logs/ ac at least 10? in large end by 16 ft long Set diameter based on cruise
	16+	29	0	1,141	1,170								0	0				No treatment - residual conifer dbh would be too small to contribute the required sizes for CWD and snags.	--			
	all ≥ 8	29	0	1,258	1,287	37	below	below	below	below	below	below			below	below	below		--			
Sec.33 , T.26S.,R9W. Burnt Ck. OI: 240143 / unit: 15A (no hdwd CWD)	8 - 15	0	0	2,627	2,627													No treatment to obtain terrestrial CWD & snags- residual dbh would be too small to contribute the required sizes.	10 in/ 64 ft	0	0	0
	16+	57	0	1,498	1,555								1.2	48.9					--			
	all ≥ 8	57	0	4,125	4,182	24	below	below	below	within	above	within			exceed	within	below		--			
Sec. 33, T.26S.,R9W. Burnt Ck. OI: 240145 / unit: 15B (no hdwd CWD)	8 - 15	0	0	919	919													alder conversion areas in unit	13 in/ 86 ft	0	3 snag/ ac 16 to 18 in dbh	
	16+	61	114	2,826	3,001								0.7	42.8				DC1+2 amounts in unit within lower range for DC2 in old growth (Spies & Franklin 1991).	--			
	all ≥ 8	61	114	3,745	3,920	38	exceed	within	below	within	above	within			exceed	within	below	Snag recruitment desired based on field observation	--			
Sec. 4, T.27S.,R9W. Burnt Ck. OI: 240535 / unit: 15D (no hdwd CWD)	8 - 15	0	8	942	950													Treat stand to provide future DC2 CWD: Recruiting 1 tree/ ac for CWD would increase levels of DC1+2 CWD to within range of DC2 observed in old-growth stands (Spies; Franklin 1991).	17 in/ 95 ft	18 trees = 0.12 t/ac 16 to 18 in dbh or largest trees <18 in dbh /100 ft of stream	2 snag/ac 17 to 18 in dbh	1 tree/ac 16 to 18 in dbh
	16+	36	51	2,887	2,974								0.4	26.3					7 snags			
	all ≥ 8	36	59	3,829	3,924	37	within	within	below	within	above	within			exceed	within	below	Recruit 1 snag/ ac to assure presence of larger diameter DC1 snags.	0 snags			

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location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2				
Sec.4 , T.27S.,R9W. Burnt Ck. OI: 240531 / unit: 15E (hdwd CDW = 0.4 tons/ac - 30 cubic ft)	8 - 15	0	0	902	902													alder conversion areas in unit	9 in/ 69 ft	0	0	0
	16+	23	73	793	889								0	0				No treatment to obtain terrestrial CWD & snags - residual dbh would be too small to contribute the required sizes.	--			
	all ≥ 8	23	73	1,695	1,791	25	exceed	within	below	below	within	below			within	below	below		--			
Sec.9 , T.27S.,R9W. Burnt Ck. OI: 240556 / unit: 15F (no hdwd CWD)	8 - 15	0	0	642	642													Treat stand to provide future DC2 CWD: Recruiting 1 tree/ ac for CWD would increase levels of DC1+2 CWD to within range of DC2 observed in mature stands (Spies; Franklin 1991). Snag recruitment desired based on field observation	15 in/ 97 ft	15 trees = 0.30 t/ac 16 to 18 in dbh or largest trees <18 in dbh /100 ft of stream	2 snag/ ac 16 to 18 in dbh	1 tree/ac 16 to 18 dbh
	16+	20	15	3,120	3,155								0	0					--			
	all ≥ 8	20	15	3,762	3,797	39	below	below	below	within	exceed	within			exceed	within	below		--			
Sec.9 , T.27S.,R9W. Burnt Ck. OI: 240555 / unit: 15G (no hdwd CWD)	8 - 15	0	0	423	423													thin alder in stand Diameter distribution limits options for recruiting 16+ in diameter CWD & snags. Recruiting 1 tree/ ac for CWD would increase levels of DC1+2 to within the range for mature stands (Spies; Franklin 1991). Defer snag recruitment until diameter distribution becomes more favorable for recruiting large snags.	13 in/ 87 ft	15 trees = 0.21 t/ac 15 to 18 in dbh or largest trees <18 in dbh /100 ft of stream	0	1 tree/ ac 15 to 18 in dbh
	16+	0	55	3,237	3,292								0	0					--			
	all ≥ 8	0	55	3,660	3,715	34	within	below	below	within	exceed	within			exceed	within	below		--			

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2				
Sec.9 , T.27S.,R9W. Burnt Ck. unit: 15H	8 - 15	--	--	--	0													alder conversion	--	0	0	0 conifer CWD. Leave 2 logs/ ac at least 10? in large end by 16 ft long. Set diameter based on cruise data
	16+	--	--	--	0								--	--				insufficient conifer stocking to support conifer CWD and snag recruitment.	--			
	all ≥ 8	0	0	0	0	29													--			
Sec.9 , T.27S.,R9W. Upper Tioga OI: 240560 / unit: 16 (no hdwd CWD)	8 - 15	0	0	1,518	1,518													No treatment to obtain terrestrial CWD & snags- residual dbh would be too small to contribute the required sizes.	10 in/ 64 ft	0	0	0
	16+	0	0	2,625	2,625								0	0					--			
	all ≥ 8	0	0	4,143	4,143	26	below	below	below	within	exceed	within			exceed	within	below		--			
Sec. 14, T.27S.,R9W. unit 17	8 - 15	--	--	--	0													CWD recruitment desired based on field observation.	11 in/ 84 ft	0	2 snags/ ac 17 to 19 in dbh	1 tree/ac 17 to 19 in dbh
	16+	--	--	--	0								--	--				creating 2 snags/ ac would result in ≥60% of habitat for excavators using 15"+ and 17"+ snags	0 snags			
	all ≥ 8	0	0	0	0	66	--	--	--	--	--	--			--	--	--		0 snags			
Sec. 13, T.27S.,R10 W. Middle Tioga OI: 240863 / unit: 18 (hdwd CDW = 0.1 tons/ac - 11 cubic ft)	8 - 15	0	0	340	340													Treat stand to meet overall decay class levels - recruiting 3 trees/ac would increase total CWD levels to within the range observed in mature stands.	18 in/ 123 ft	45 trees = 0.27 t/ac 18 to 22 in dbh or largest trees <22 in dbh /100 ft of stream	0	3 trees/ac 18 to 22 in dbh
	16+	25	82	784	891								0.6	44.1					19 snags			
	all ≥ 8	25	82	1,124	1,231	67	exceed	within	below	below	below	below			below	below	below	snag recruitment not needed: 5 snags/ ac>19 in dbh present	5 snags			
Sec.13 , T.27S.,R10 W. Middle Tioga OI: 240863 / unit: 19 (no hdwd CWD)	8 - 15	0	0	48	48													DROPPED	21 in/ 124 ft			
	16+	0	272	3,003	3,275								2.7	136.8					20 snags			

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location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2					
	all ≥ 8	0	272	3,051	3,323	67	exceed	exceed	within	within	above	within			exceed	below	exceed		2 snags			
Sec. 18, T.27S.,R9W. Middle Tioga OI: 241317 / unit: 20 (no hdwd CWD)	8 - 15	0	24	490	514													Treat stand to provide future DC2 CWD: Recruiting 3 trees/ ac for CWD would increase levels of DC1+2 CWD to within range of DC2 observed in old-growth stands (Spies; Franklin 1991). snag recruitment not needed: 17 snags/ ac>19 in dbh present	19 in/ 125 ft 8 snags 17 snags	21 trees = 0.21 t/ac 18 to 24 in dbh or largest trees <24 in dbh /100 ft of stream	0	3 trees/ac 18 to 24 in dbh
	16+	0	44	1,213	1,257								0	0								
	all ≥ 8	0	68	1,703	1,771	64	exceed	within	below	below	within	below			within	below	below					
Sec. 17, T.27S.,R9W. Middle Tioga OI: 240604 / unit: 21 (no hdwd CWD)	8 - 15	0	14	951	965													Treat stand to provide future DC2 CWD: Recruiting 3 trees/ ac for CWD would increase levels of DC1+2 CWD to within range of DC2 observed in old-growth stands (Spies; Franklin 1991). snag recruitment not needed: 14 snags/ ac>19 in dbh present	14 in/ 90 ft 8 snags 14 snags	3 trees = 0.03 t/ac 17 to 20 in dbh or largest trees <20 in dbh /100 ft of stream also drop 3 trees into each of 5 headwalls	0	3 trees/ ac 16 to 20 in dbh
	16+	0	20	1,709	1,729								0	0								
	all ≥ 8	0	34	2,660	2,694	62	within	below	below	within	exceed	below			exceed	below	below					
Sec.17 , T.27S.,R9W. Upper Tioga OI: 240607 / unit: 22A (no hdwd CWD)	8 - 15	0	0	1,323	1,323													DROPPED	--			
	16+	0	0	3,008	3,008								0	0					--			
	all ≥ 8	0	0	4,331	4,331	30	below	below	below	within	exceed	within			exceed	within	below		--			

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2				
Sec.20, T.27S.,R9W. unit: 22b	8 - 15	--	--	--	--													alder conversion	13 in/ 85 ft	0	0	0 conifer CWD. Leave 2 logs/ ac at least 10? in large end by 16 ft long. Set diameter based on cruise data
	16+	--	--	--	--								--	--				insufficient conifer stocking to support snag recruitment treatment	0 snags			
	all ≥ 8	--	--	--	--	51	--	--	--	--	--	--			--	--	--		0 snags			
Sec. 21, T.27S.,R9W. Upper Tioga OI: 240632 / unit: 22C (no hdwd CWD)	8 - 15	0	0	293	293													Diameter distribution limits options for snag and CWD recruitment. Amounts of DC 1+2 CWD within range of DC 2 for old-growth (Spies; Franklin 1991). Need for instream wood. CWD recruitment would insure presence of mid-size pieces of down wood.	14 in/ 79 ft	18 trees = 0.18 t/ac 15 to 17 in dbh or largest trees <17 in dbh /100 ft of stream	1 snag/ ac 15 to 17 in dbh	1 tree/ ac 15 to 17 in dbh
	16+	36	111	5,521	5,668								0	0					0 snags			
	all ≥ 8	36	111	5,814	5,961	33	exceed	within	below	exceed	exceed	exceed			exceed	within	below	Recruit 1 snag/ ac to provide 40% habitat potential for excavators using 11"+ & 15"+ snags	0.3 snags			
Sec. 21, T.27S.,R9W. Upper Tioga OI: 240633 / unit: 23 (no hdwd CWD)	8 - 15	0	0	98	98													No treatment to obtain terrestrial CWD & snags- residual dbh would be too small to contribute the required sizes.	10 in/ 72 ft	0	0	0
	16+	0	0	7,368	7,368								0	0					--			
	all ≥ 8	0	0	7,466	7,466	32	below	below	below	exceed	exceed	exceed			exceed	within	below		--			
Sec. 5, T.27S.,R9W. OI: 241278 / unit: 24 (hdwd CDW = 0.2 tons/ac - 13 cubic ft)	8 - 15	0	0	312	312													Treat stand to provide future DC2 CWD: Recruiting 3 trees/ ac for CWD would provide for >255 cu ft of DC1+2 CWD.	18 in/ 123 ft	42 trees = 0.36 t/ac 18 to 24 in dbh or largest trees <24 in dbh /100 ft of stream	0	3 tree/ac 18 to 24 in dbh
	16+	0	87	1,189	1,276								0	0					7 snags			
	all ≥ 8	0	87	1,501	1,588	68	exceed	within	below	below	within	below			below	below	below	snag recruitment not needed: 6 snags/ ac>19 in dbh present	6 snags			

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin (1991):			Observed total CWD volume within or greater than natural range for CWD observed by Spies & Franklin (1991):			DC 1&2 ≥16 in. Dia and ≥16 ft long***		Observed CWD volume relative to CWD recommendations in LSR Assessment (1998) and Watershed Analysis (2001)			Treatment Recommendation for terrestrial CWD. Treatment Recommendations for snag recruitment	pretreat avedbh/ ave ht snags/ac 11-19 in dbh snags/ ac >19 in dbh	in stream wood recruitment tree count based on recruiting 1 tree/ 100 ft of stream	Snag recruitment	CWD total for terrestrial habitat and instream wood recruitment
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces/ ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams	255 to 385 cubic ft of DC 1&2					
Sec. 5, T.27S.,R9W. OI: 240545 / unit: 25 (hdwd CDW = 0.3 tons/ac - 39 cubic ft)	8 - 15	0	0	787	787													Stand within cwd levels for mature stand (Spies; Franklin 1991). Recruit 3 snags/ ac to provide 100% habitat for excavators using 15"+ & 17"+ snags	18 in/ 120 ft 0 snags 0 snags	0	3 snags/ ac 18 to 21 in dbh	0
	16+	6	117	1,311	1,434								1.0	40.2								
	all ≥ 8	6	117	2,098	2,221	53	exceed	within	below	below	within	below			within	below	below					
Sec.1 , T.27S.,R10 W. Middle Tioga OI: 240760/ unit: 26 (Includes hdwd conv. areas. No hdwd CWD in plots)	8 - 15	0	0	134	134													Recruiting 2 trees/ ac for CWD would provide approx. 255 cu ft of DC1+2 recruiting an additional 1 snag/ ac would result in between 60% and 100% of potential habitat levels for excavators using 11"+, 15"+, & 17"+ snags	14 in/ 107 ft 0 snags 2 snags	0	1 snags/ ac 17 to 23 in dbh	2 tree/ac 17 to 23 in dbh
	16+	0	121	139	260								1.7	171.1								
	all ≥ 8	0	121	273	394	56	exceed	within	below	below	below	below			below	below	below					
Sec.1 , T.27S.,R10 W. Middle Tioga OI: 240760 / unit: 27 (hdwd CDW = 0.4 tons/ac - 35 cubic ft)	8 - 15	0	0	662	662													most of unit alder conversion. Conifer on ridges conifer component too limited to allow recruitment of conifer CWD & snags	13 in/ 77 ft 0 snags 0.5 snags	30 trees = 0.63 t/ac fall the largest alder next to each 100 ft reach of stream	0	0 conifer CWD. Leave 2 logs/ ac at least 10? in large end by 16 ft long Diameter to be determined based on cruise data
	16+	0	46	1,218	1,264								0.8	62.2								
	all ≥ 8	0	46	1,880	1,926	40	within	below	below	below	within	below			within	below	below					

*** This is reference to the Matrix standards and guidelines for CWD is for comparison purposes only. These standards do not apply to LSR or Riparian Reserve lands.
**** stand is mixed species & mixed ages. D3-=1950 area averages 15 in dbh/ 100 ft ht; D3=1969 area averages 12 in dbh/ 69 ft ht; D3-RA=1967 area averages 11 in dbh/ 87 ft ht.